Corn Growth and Development

V1 – Emergence

Emergence occurs when the first leaves, called the coleoptile or coleorhiza, appear above the soil surface. The seed absorbs water (about 30% of its weight) and swells to fill the seed cavity. The root meristem quickly emerges near the tip of the kernel, depending on soil moisture and temperature conditions. The coleoptile emerges from the embryo side of the kernel and is pushed to the soil surface by merocytotrophic elongation. The racemose encloses the plumule leaves that open as the shoot apex approaches the soil surface.

Management

Ideal soil temperatures (50 to 55 degrees Fahrenheit) and moisture conditions promote rapid emergence (5 to 7 days). Optimum seed placement varies from 1 to 2 inches deep. Appropriate planting depth can vary with declining soil temperature at emergence. Cold, dry, and deep planting can delay emergence and reduce stand counts.

V2 – Second-Leaf

Nodal roots begin to emerge below ground. Seminal roots begin to senesce. Root mass affects final yield. Four to six leaves in 17 1/2 feet for 30-inch row spacing = 30,000 plants per acre), early- season weeds, insects, diseases, and other production issues.

V3 – Third-Leaf

One leaf with collar visible (structure found at the base of the leaf). The first leaf in corn has a rounded tip. From this point until flowering (R1 stage), leaf stages are defined by the uppermost leaf visible. The growing point is located below the surface until the late V5 stage.

Management

Scout for proper emergence (e.g., 30 plants in 17 1/2 feet), 300,000 plants/acre; 30 inches per plant spacing = 30,000 plants per acre), early- season weeds, insects, diseases, and other production issues.

V4 – Fourth-Leaf

Nodal roots dominate, occupying more than 60% of total root mass. Nodal roots begin to senesce. Root mass affects final yield. Appropriate planting depth can vary with declining soil temperature at emergence. Cold, dry, and deep planting can delay emergence and reduce stand counts.

V5 – Fifth-Leaf

Maximum plant height is achieved. Tassel is visible at the top of the plant. Silks may or may not have emerged. Nodal roots begin to emerge below ground. Nodal roots begin to senesce. Root mass affects final yield.

Management

Scout for weeds, insects, and diseases. Rapid nutrient uptake begins at this stage. Rapid growth. This stage occurs within the 30 to 35% moisture range and is physiologically mature. Management

Grain is not ready for storage. Frost or any biotic or abiotic stress does not impact yields after this development stage. Lodge, disease, insect, or weed damage, or cold can result in physical loss of yield. Harvest can proceed, but recommended moisture for long-term storage is 14.5%. Coalescence is the water drop to things such as European corn borer damage.

V6 – Sixth-Leaf

Six leaves with collar visible. The first leaf with the rounded tip is senescent. Consider this point when counting leaves. The growing point emerges above the soil surface. All plant parts are initiated. Sometime between V5 and V6, the number of potential leaves (near germination) andinode number is approximately 1,000. Potential row number is affected by genetics and environmental factors. The stress conditions. The plant increases in height due to self-pollination, nodal roots are established in the lowest, below-ground nodes of the plant.

Management

Scout for weeds, insects, and diseases. Rapid nutrient uptake begins at this stage. Timing nutrient applications to match this uptake is especially important for greater nutrient use efficiency, particularly for mobile nutrients such as nitrogen.

V10 – Tenth-Leaf

Beginning to develop in the lower above-ground nodes of the plant. Until this stage, rate of leaf development is approximately 2 to 3 leaves per day per plant.

Management

Nutrient production = K > nitrogen = N > phosphorus = P = water (0.25 inch per day) demands for the crop are high. Heat, drought, and nutrient deficiencies will affect potential number of kernels and ear size. Scout for root lodging issues and diseases (e.g., corn root, brown spot). Weed control is critical since corn does not tolerate early-season competition for nutrients, radiation, and water.

R1 – Silking

Flowering begins but a silk is visible outside the husks. The first silks to emerge are those attached to potential kernels near the base of the ear. Silks remain active until pollinated. Pollen falls from the tassel to the silks, fertilizing the ovule to produce an embryo. Potential kernel number is determined. Maximum plant height is achieved. Following fertilization, silval division is occurring within the embryo.

Management

Nutrient (K and P accumulation is still progressing. K is almost complete) and water (0.33 inch per day) demands are at the peak. Heat and drought will affect pollination and final grain number. Defoliation by hail or other factors such as insects will produce a large yield loss.

R2 – Blister

Silks darken and begin to dry out (approximately 12 days after R1). Kernels are white and blister-like in shape and contain a clear fluid. Kernels are approximately 85% moisture, embryos develop in each kernel. Cell division is complete. Grain filling commences.

Management

Stress can reduce yield potential by reducing final grain number (abortion).

R3 – Milk

Silks dry out (approximately 20 days after R1). Kernels are yellow, and a milk-like fluid can be squeezed out of the kernel when crushed between fingers. This fluid is the result of the starch accumulation process.

Management

Stress will still cause kernel abortion, initially from the top ear layers.

R4 – Dough

Starch material within the kernels has dough-like consistency (approximately 26 to 30 days after R1). Rapid accumulation of starch and nutrients occurs, kernels have 70% moisture, and begin to dent on the top. Material squelched out of the kernel has dough-like consistency.

Management

Stress can produce unfilled or shallow kernels and will reduce yield potential. A spray of a treatment on grain-quality can be severe when it occurs at this stage (23 to 40% yield loss from light to killing frost, respectively).

R5 – Dent

Most of the kernels are dented. Kernel moisture declines to approximately 53% (38 to 42 days after R1) as the starch content increases.

Management

Stress can reduce kernel weight. Stage here is approaching (at around 50 kernel/milliliter).

R6 – Maturity

A black layer forms at the base of the kernel, blocking movement of dry matter and nutrients from the plant to the kernel (50 to 60 days after R1). Kernels are yellow, hard, and dry. Although potential kernel moisture (30 to 35% moisture) and are physiologically mature. Management

Grain is not ready for storage. Frost or any biotic or abiotic stress does not impact yields after this development stage. Lodging from disease, insect, or weed damage, or cold can result in physical loss of yield. Harvest can proceed, but recommended moisture for long-term storage is 14.5%. Coalescence is the water drop to things such as European corn borer damage.